Cockrell Creek
TMDL for Shellfish Waters

Heathsville, VA

1 March 2005

What is a TMDL?

TMDL = Total Maximum Daily Load = maximum amount of a pollutant that can enter a waterbody without violating water quality standards (WQS)

WQS = numeric or narrative limits on pollutants that ensure the protection of human health and of aquatic life

Why are TMDLs needed?

"The primary mission of the TMDL program is to protect public health and the health of impaired aquatic ecosystems by ensuring attainment of water quality standards, including beneficial uses." (US EPA, 1998)

Legal Basis for TMDLs

- TMDLs required by Federal and State law
  - 1972 Clean Water Act (CWA), Section 303(d)
  - 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA)
- CWA and WQMIRA require:
  - Water sampling
  - Periodic assessments
  - Listing of impaired waters (that violate water quality standards)
  - TMDL development for impaired waters
  - Implementation plans and follow up sampling

Who is, or can be, involved?

- **Virginia Department of Health, Division of Shellfish Sanitation**
- **Virginia Department of Conservation and Recreation**
- **Virginia Department of Environmental Quality**
- **Virginia Institute of Marine Science (as a contractor)**
- **Other State Agencies, Local Governments and Planning Districts**
- **U.S. Environmental Protection Agency and other appropriate federal agencies**
- **Citizens, citizen groups, environmental groups, businesses, in essence you!**

The TMDL Process in VA

- Three Step TMDL Process in VA
  - TMDL Development (Find the source of the pollutant & determine the reduction needed)
  - Implementation Plan Development (Identify conservation measures to fix the problem. Conservation measures are often called Best Management Practices or BMPs.)
  - Implement the BMPs and sample to see improvement.

Where do we need TMDLs?

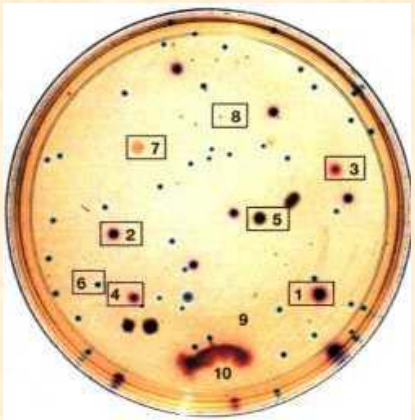
- TMDLs need to be developed for water bodies that do not meet water quality standards (impaired waters).
- Impaired waters occur throughout Virginia in lakes, streams and tidal waters.
- In Virginia, TMDLs for 636 impaired waters need to be developed by 2010. Of these, 220± are shellfish water closures under a consent order.

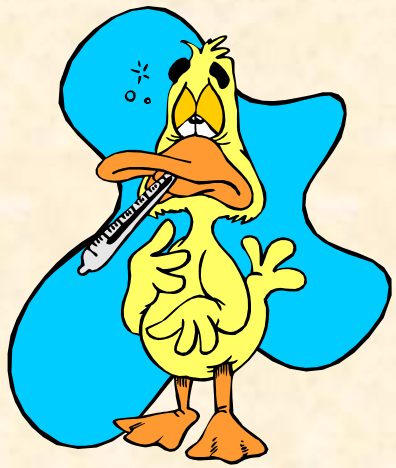
Why a TMDL for the Cockrell Creek Watershed?

- VDH Division of Shellfish Sanitation (DSS) monitors fecal coliform levels in shellfish waters
- Applicable water quality standard: 30-month geometric mean not exceeding 14 MPN/100 mL, and a 90th percentile not exceeding 49 MPN/100 mL
- Cockrell Creek has observed exceedances that necessitate TMDLs be developed to bring them into compliance

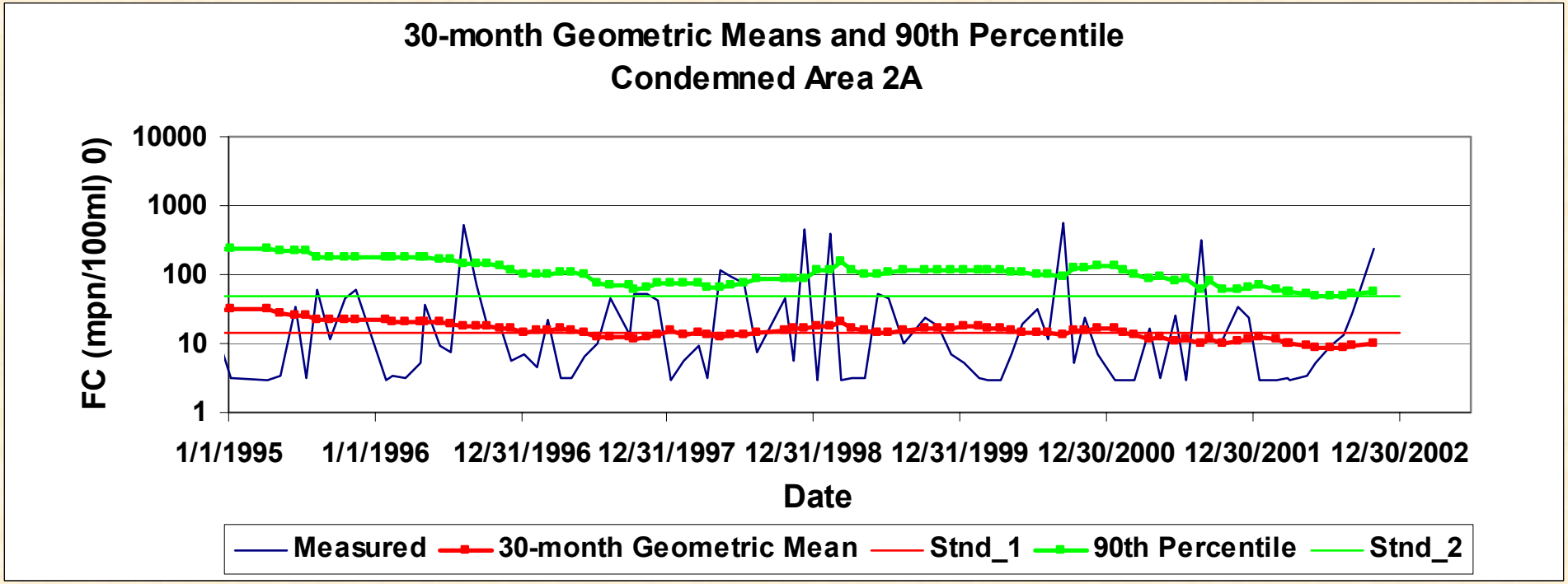
What are fecal coliform bacteria?

- Bacteria present in the intestines of warm blooded animals, like livestock, wildlife, birds, and humans
- Indicator of the potential presence of pathogens in water
- E. coli are a specific kind of fecal bacteria more present in humans

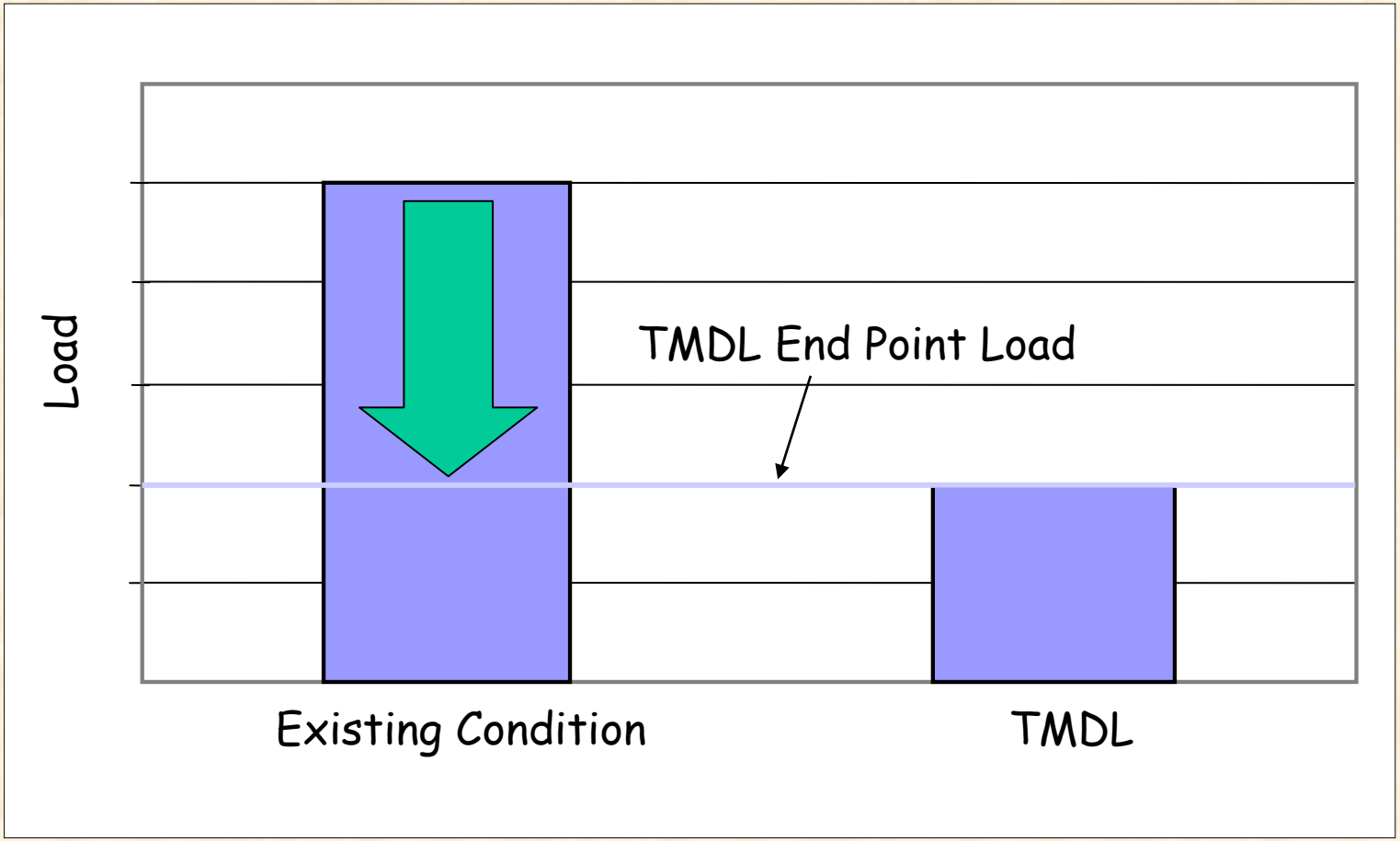




Cockrell Creek Water Quality Data



An Example TMDL



Reducing existing bacteria load to the TMDL end point load is expected to restore water quality.

Required Elements of a TMDL

1. Be developed for critical stream conditions;
2. Be developed to meet water quality standards;
3. Consider seasonal variations;
4. Include wasteload and load allocations;

   - waste load = permitted human discharges

   - load allocation = loads due to wildlife, cattle, pets

Required Elements of a TMDL

5. Include a margin of safety;

   - 5% MOS is required conservative assumptions may substitute

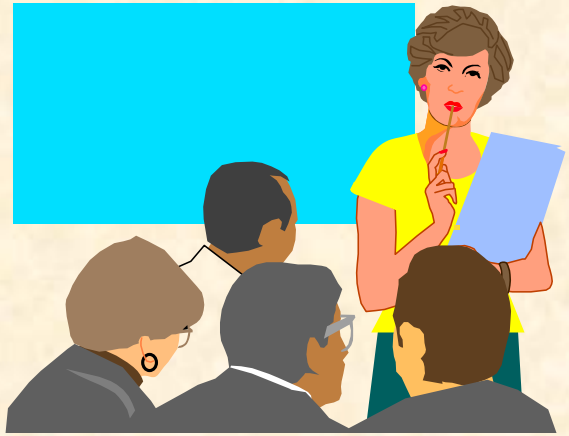
6. Consider impacts of background contributions;

   - essentially wildlife contributions

7. Be subjected to public participation; and
8. Have reasonable assurance for implementation.

Virginia's TMDL Development Process

- Public notice for TMDL development
- TMDL study
- Public notice for Draft TMDL
- Final TMDL report
- EPA & SWCB approval
- Implementation process



==> Opportunities for public input and participation

What information might be used to develop a TMDL?

- VDH Sanitary Shoreline Survey
- VDH Bacteria monitoring
- Population estimates (human,pets,livestock)
- Affected waters volume
- Bacterial Source Tracking Data
- Land use, Climate, Tide and similar data
- DEQ permit data if applicable
- DEQ spill response and remediation data

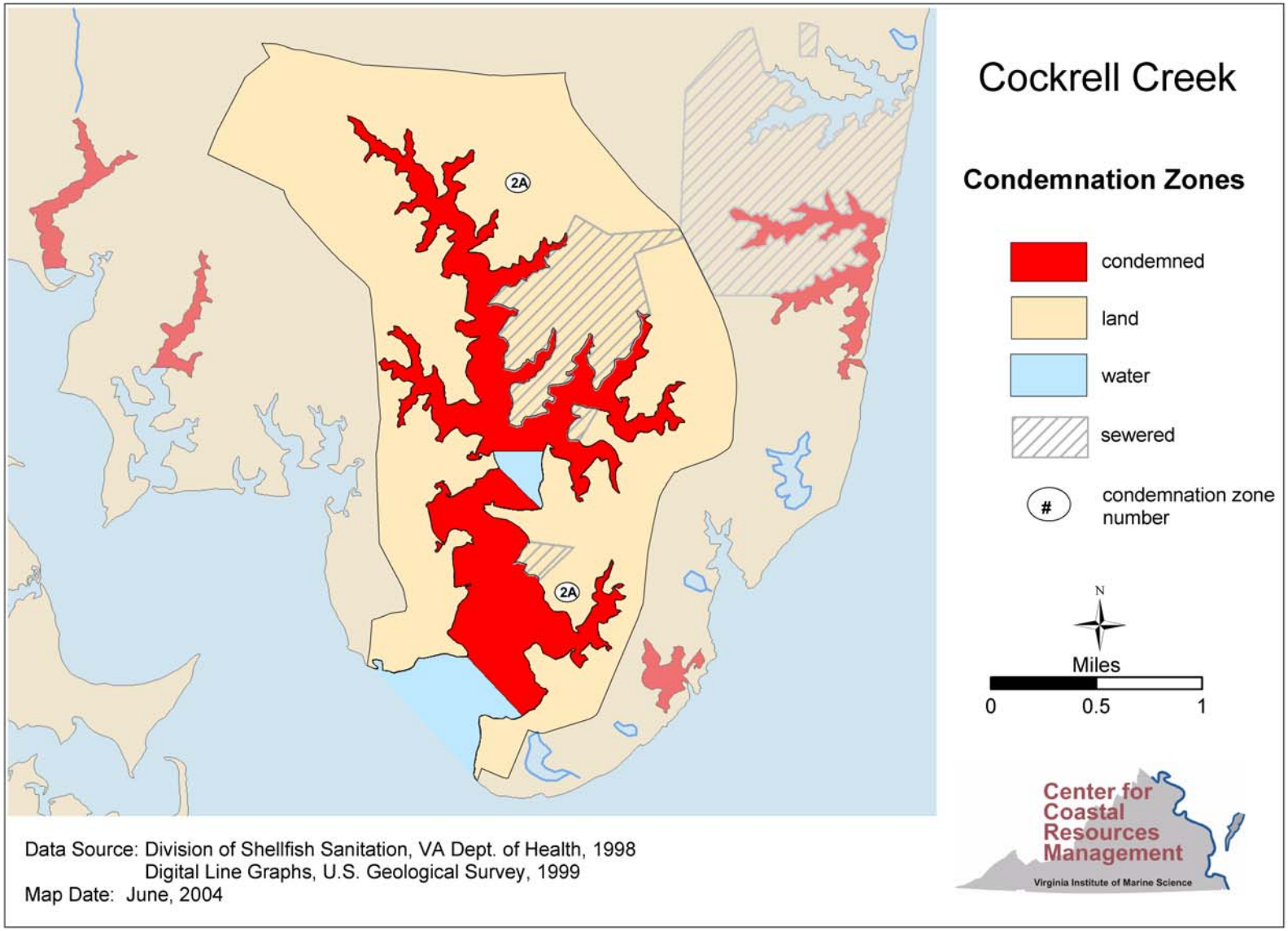

Cockrell Creek
Condemnation Zones
condemned
land
water
sewered
#
condemnation zone number
2A
2A
N
Miles
0
0.5
1
Center for Coastal Resources Management
Virginia Institute of Marine Science
Data Source: Division of Shellfish Sanitation, VA Dept. of Health, 1998
Digital Line Graphs, U.S. Geological Survey, 1999
Map Date: June, 2004

Figure 4.2

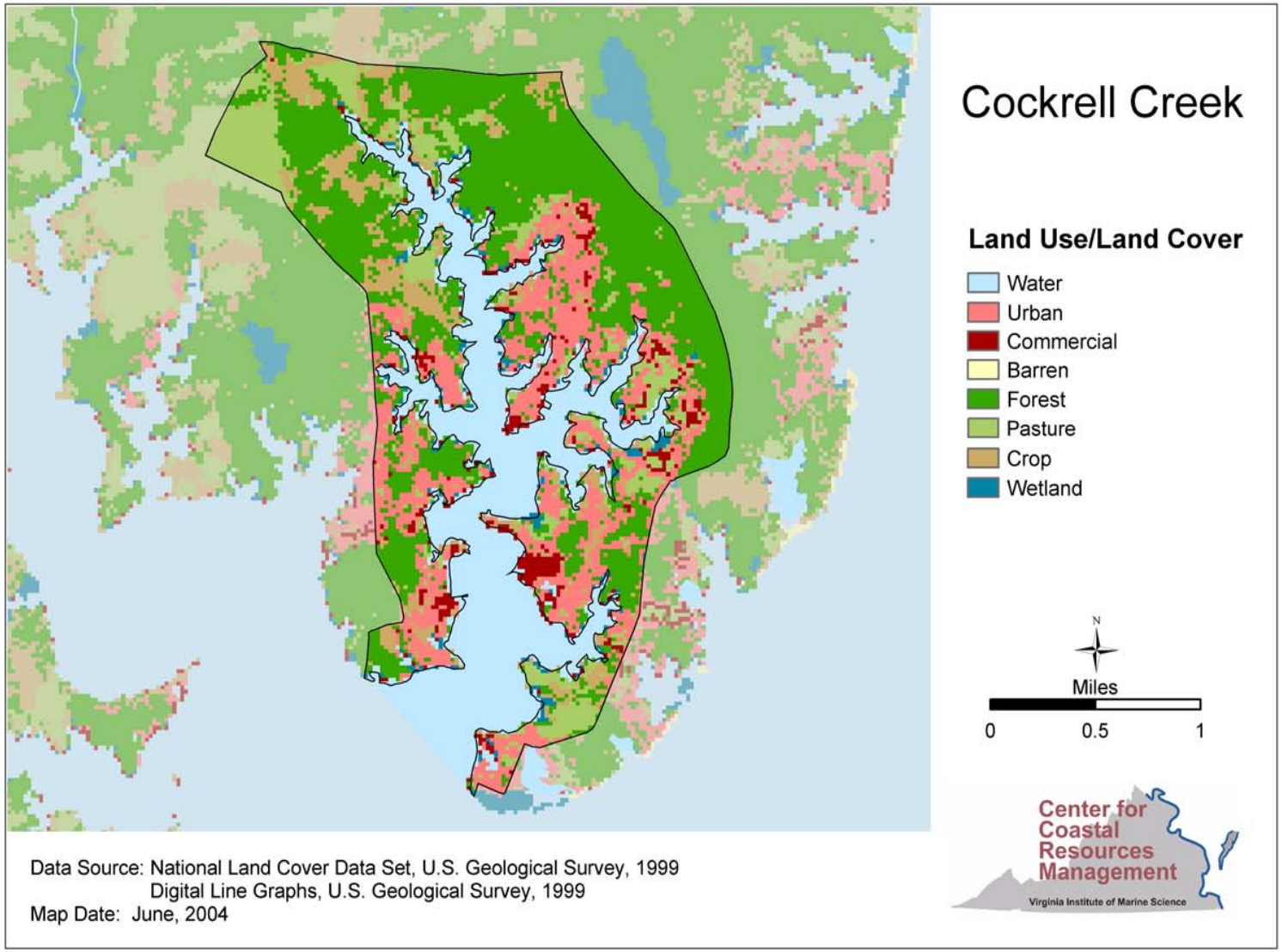
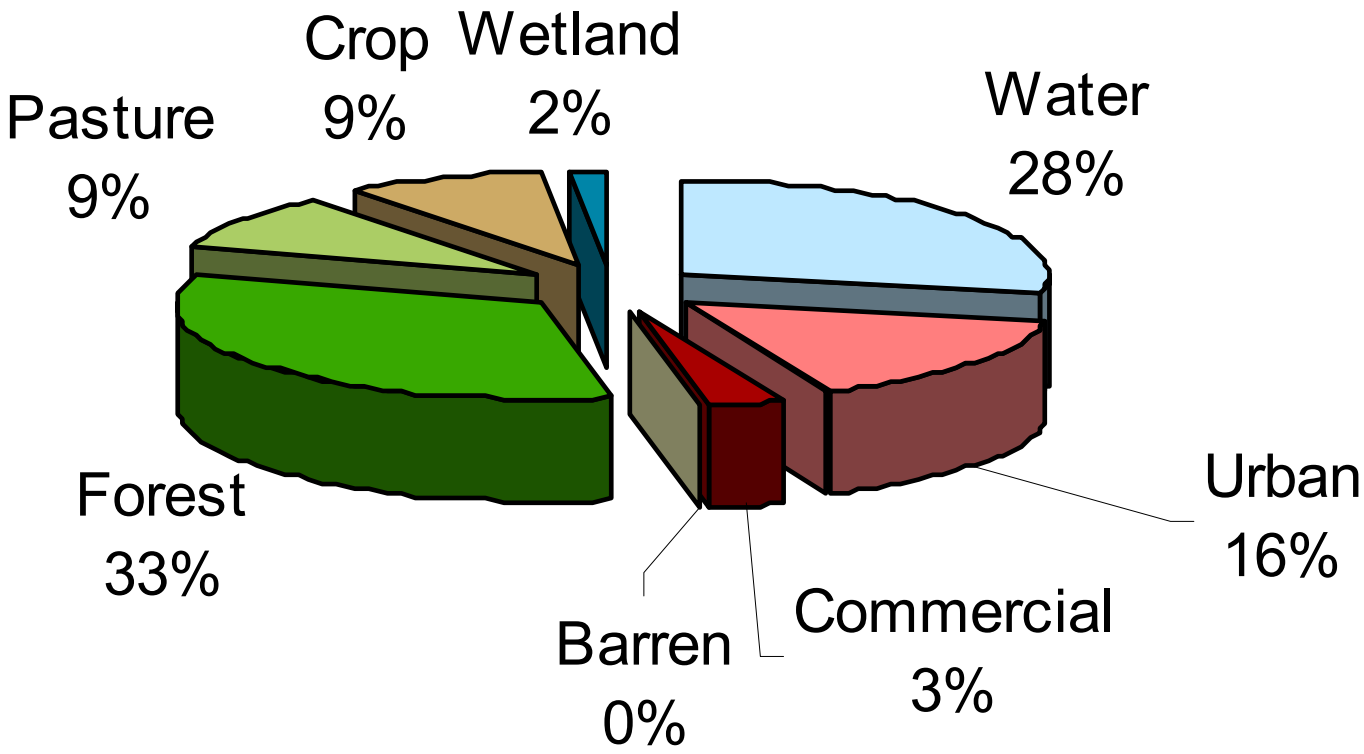

Cockrell Creek
Land Use/Land Cover
Water
Urban
Commercial
Barren
Forest
Pasture
Crop
Wetland
N
Miles
0
0.5
1
Center for Coastal Resources Management
Virginia Institute of Marine Science
Data Source: National Land Cover Data Set, U.S. Geological Survey, 1999
Digital Line Graphs, U.S. Geological Survey, 1999
Map Date: June, 2004

Figure 3.1

Land Use Distribution
Cockrell Creek



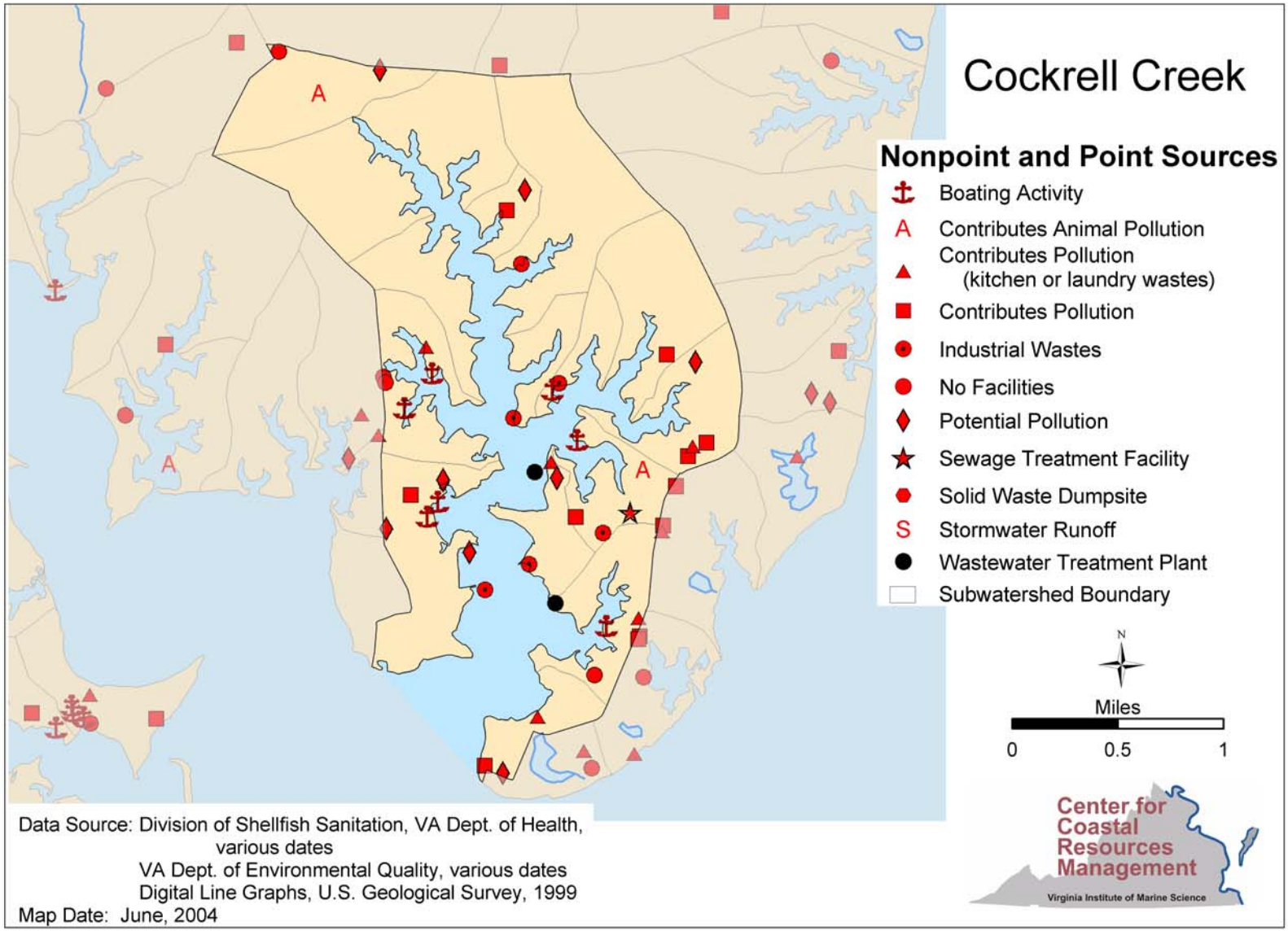

Cockrell Creek
Nonpoint and Point Sources
Boating Activity
A Contributes Animal Pollution
Contributes Pollution (kitchen or laundry wastes)
Contributes Pollution
Industrial Wastes
No Facilities
Potential Pollution
Sewage Treatment Facility
Solid Waste Dumpsite
S Stormwater Runoff
Wastewater Treatment Plant
Subwatershed Boundary
N
Miles
0
0.5
1
A
A
A
Data Source: Division of Shellfish Sanitation, VA Dept. of Health, various dates
VA Dept. of Environmental Quality, various dates
Digital Line Graphs, U.S. Geological Survey, 1999
Map Date: June, 2004
Center for Coastal Resources Management
Virginia Institute of Marine Science

Figure 4.4

Tidal Prism Model + BST TMDL Approach

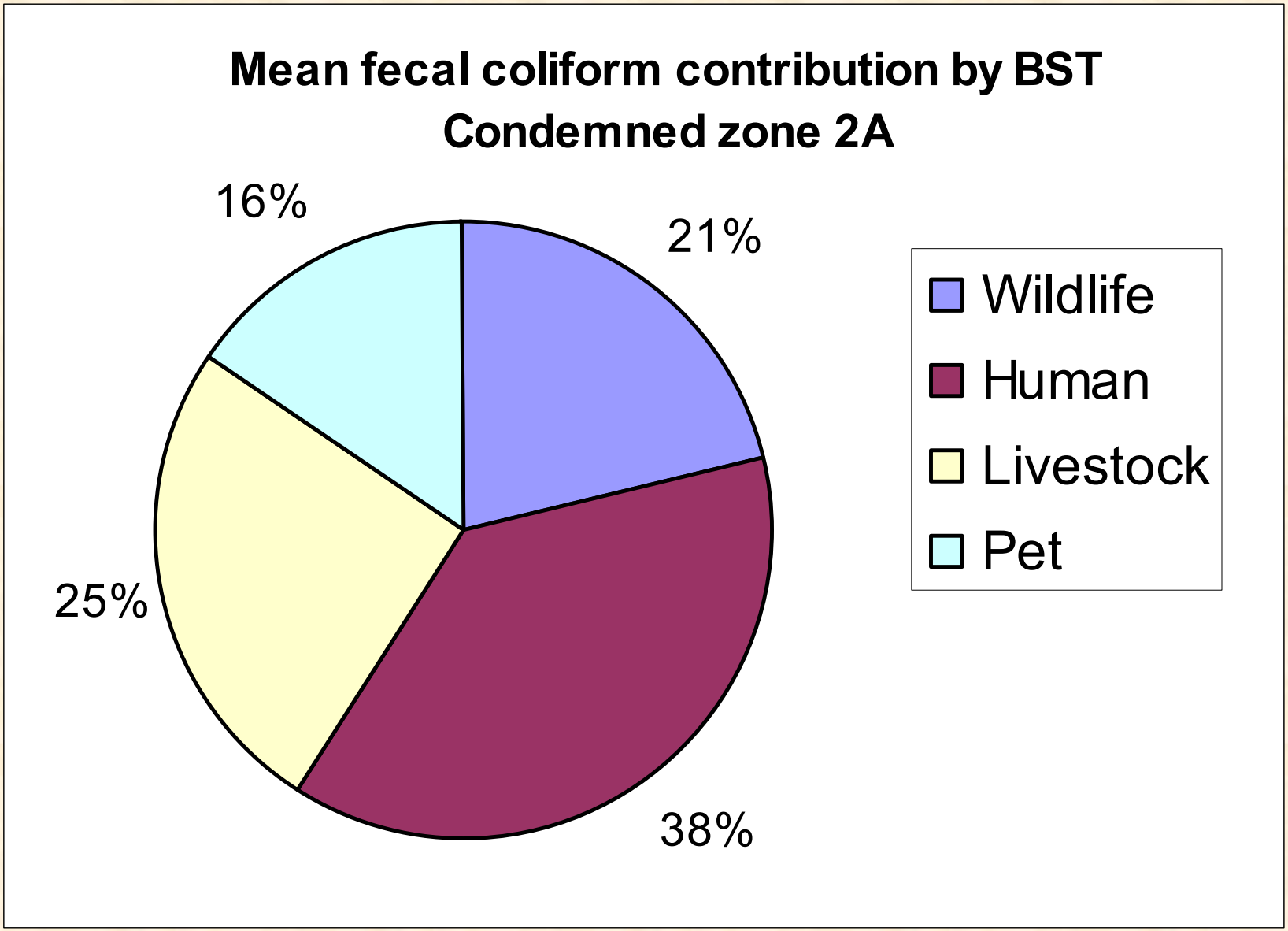
- Calculate volume of impaired water
- Determine appropriate tide and decay factors
- Calculate the acceptable loading = standard x volume
- Actual loading = (critical fecal count- losses due to decay and tide) x volume
- Source determination - “BST” = “ARA” antibiotic resistance analysis

Use of BST in the TMDL

- Uses VDH-DSS routine monitoring data to calculate critical fecal count
- Uses 9 supplementary BST samples at selected stations to identify bacteria sources:
- Uses Antibiotic Resistance Analysis

as BST method for source load allocation into 4 categories:

1. **Human**
2. **Pets**
3. **Livestock**
4. **Wildlife**


Mean fecal coliform contribution by BST
Condemned zone 2A
16%
21%
25%
38%
Wildlife
Human
Livestock
Pet

What do we think we know now?

- Based on shoreline surveys and BST data at least a portion of the bacterial are from human sources
- Pets and Livestock are two other controllable sources of bacteria
- Wildlife is a significant component which may be considered as background

Next Steps

- **Form a Technical Advisory Committee (TAC) comprised of local government representatives, citizens, and concerned groups**
- **TMDL Development**
  - **field work is complete**
  - **BST analysis is complete**
  - **a draft TMDL will be available in the future, but TAC guidance and public input is required to complete**
  - **stakeholder involvement: timing of public meetings?**
- **Develop Implementation Plan**
- **Implementation**

How can you help?

First 30 Day Public Comment Period:

March 1st – March 31st, 2005

Send written comments to:

Chris French
4949-A Cox Rd
Glen Allen VA 23060
804/527-5124
rcfrench@deq.virginia.gov